4. Slovenski geološki kongres

Ankaran, 8.–10. oktober 2014

POVZETKI IN EKSKURZIJE

ABSTRACTS AND FIELD TRIPS

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ALLUVIAL GOLD OCCURRENCES IN MACEDONIA

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Abstract: The paper refers to the secondary gold ore formations in Macedonia. Certain rules and criteria for the appraisal the gold ore occurrences were established. Available data of long term investigation of this type of gold occurrences were each ore occurrence. Particular attention was paid to Konska Reka gold alluvial sediments, as to other ore occurrences appraised of particular importance. Nine ore occurrences of this type were analyzed and appraised.

Key words: alluvial gold occurrences, gold reserve, investigation works, chemical analyses, prospected, alluvial sediments.

INTRODUCTION

Alluvial gold occurrences in the Macedonian area have a long history. Historical data dates back to the period of Alexander the Great. Metal money inscribed with his figure, has been found at old alluvial dumps, close to the old village of Konsko - Gevgelija. The dump remnants of the washing activities at the Konsko area are numerous and large for that time (Fig 1). Different gold investigation and exploration data are related to the last century. Some of this data relates to the beginning of this century. Larger prospecting activities were noticed within the period between the two world wars. A proportion of the prospecting was connected to the Konska Reka alluvials and in a smaller scale to other alluvial gold occurrences (Pcinja, Vardar River, etc).

Investigation works were revived after the second world war. Many alluvial occurrences at rivers and their tributaries were prospected by panning. Some of these alluvial occurrences have also been drilled (Konska Reka, Peklani, Susevska Reka).

The area of Macedonia is drained by one large river system, the Vardar River system and two much smaller rivers (Drim River and Strumica River). The largest proportion of their waters drain into the Aegean Sea with smaller volumes draining into the Adriatic Sea. The largest river, Vardar is around 220 km in length within the Macedonian area. Other, smaller rivers are associated with the Vardar River tributaries.

The rivers and tributaries originate from mountainous parts of Macedonia. The rivers traverse many mountains and ravines. At the town of Gevgelia the waters discharge into the Aegean Sea.

Morphological features (in terms of alluvial gold deposits), such as river vallej have not been particularly studied. Some parts of river valleys were investigated b panning prospectors.

This review represents an attempt of data relating to alluvial gold occurrences I be collected and briefly exposed. They will be presented in the order given in Fig 1.

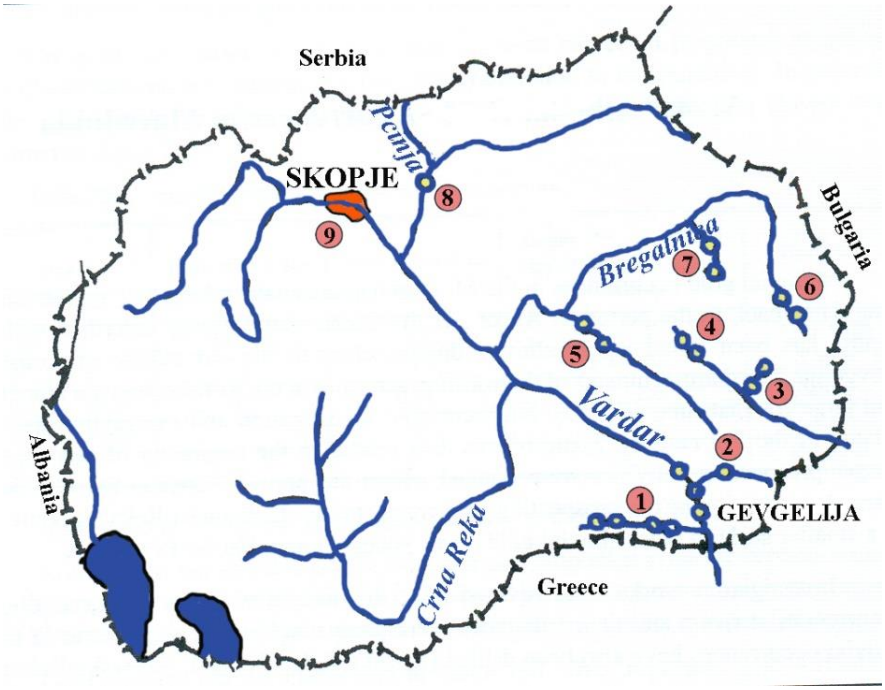

Fig. 1. Alluvial Gold occurrences in R. Macedonia

1. Konska River, 2. Anska Reka, 3. Strumica alluvial occurrences, 4. River and Creek alluvial Radovis area, 5. Lakavica gold alluvial sediments, 6. Bregalnica River, 7. Pekljanska Reka, 8. Pcinja alluvial sediments, 9. Skopje – Veles area Creek alluvials.

Gevgelia Area Alluvials

Gevgelia is a small city situated at the southern part of the Republic of Macedonia. It traversed by the largest Macedonian river (Vardar) which flows through Greece to the Aegean Sea. The Konska River (the right Vardar River tributary) influences Vardar just at Gevgelia cit Alluvial sediments of the Konska River valley were the subject of long term interest for alluvi gold. A part of the Vardar alluvial sediments, upstream from Gevgelia were partially prospecte for gold. On this basis, more attention will be directed to the Konska River alluvials.

Konska River Alluvials

The Konska River drains the waters from the eastern slopes of the Kozuf Mountain area. The river is approximately 30 km long Alluvial sediments have developed at two groups of localities. The first is situated near the old village of Konsko. The old river terraces have been the subject of historical mining and small scale exploration prior to 1979. The second group of localities relates to an area between the villages of Moin and Gornicet, west from the city of Gevgelia. Large volumes of investigations and exploration works have been carried out within this area over the last eighty years.

Numerous information exists in the form of letters, reports and short written data on the remnants of old washing activities, from various concessionaires, consulting engineers, geologists, etc. All this information can be classified in three groups, based on different periods.

The oldest data relates to the period of Alexander The Great. The enormous washing dumps are sole testimonies associated with gold washing activities of this period. They are represented at two localities. The first locality is situated at the old village of Konsko and the second at the old village of Gornicet. On the basis of the washing dump dimensions (length, width, and thickness), Draskoci (1937) appraised the dump at Gornicet as having 1,500,000 m^3 material and at Konsko 500,000 m^3 material. At the Konska Reka area this material is supposedly from the older alluvial terraces, situated approximately 60 m higher.

Fig. 2. The Konska River area

The second group of information relates to the period between the two world wars. Milovanovi*c*, later Ivanov (1961*)* have colected and reviewed all these data. The first information are associated to the people, came from eastern Serbia. They have panned approximately 220g of gold. A Belgium company in 1937/1938 investigated the area of the village of Moin. Abundant information associated to these periods can be found at Jovanovic file (1927 to 1939). According to this data, east of Moin, 45 shafts recorded 0,12 to 0,28 g/m^3. West of Moin at the Konska Reka gorge, 180 shallow shafts and four open trenches have been installed. More than 2000 m^3 material has been washed. From the fifty six shafts has gained 0,46 g/m^3 gold. One of the shafts had reached a depth of 28,5 m. Jovanovic has estimated the alluvial sediment reserves, to the West of the Moin village at 720,000,000 m^3 of material. This estimation seems to be very optimistic for many reasons. However, this data is not supported by appropriate and acceptable reports. This time was known as a time for purchasing and selling the various concessions and licences. For these goals, all available information had been used. From this point of view the information does not possess a large degree of credibility.

The third investigation period commenced in 1955 lasting to 1981, with a few breaks. Different types of investigation and exploration works were carried out during this period (geological mapping, geophysical surveying, sediment panning, digging channels and shallow shafts, large diameter drilling).

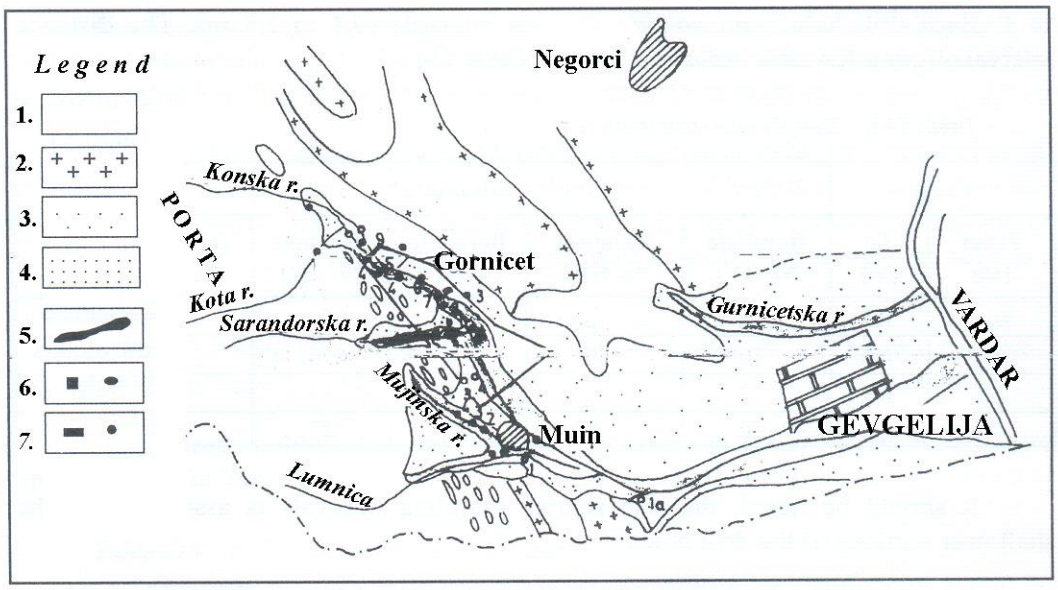

Fig. 3. Investigation at Konska Reka Alluvials

1. Gabbro – diabase complex, 2. Granite - syenite complex, 3. Alluvial terraces, 4. Young alluvials, 5. Old washing places, 6. Shafts and trenches, 7. Trrenches and shafts.

On the basis of all geological and gold content data, Petkovic (1976) has estimated alluvial gold reserves in this area. The reserves were classified as a D2 category. Owing to the great variation in gold content Petkovic has estimated gold reserves in two variants. The first comprises all gold content data. The gold reserves were appraised as being uneconomic. The second estimation comprises the gold content data at certain cut off grades. These variant gold reserves were appraised as economic. Both estimated variants of gold reserves are given in Table 1.

Table 1. *Gold reserve estimations*

Variant 1			
Blocks	**Estimated reserves (m^3)**	**Gold content (mg/m^3)**	**Gold reserve (kg)**
I - L/250/	1.780.000	52,260	90,932
I - L/400/	9.662.000	57,930	557,402
II - L/800/	17.320.400	50,440	873,620
III - L/800/	21.614.400	32,200	695,970
IV - L/800/	11.172.000	27,930	302,872
Total	**61.508.000**	**45,06**	**2.520,796**
Variant 2			
0-1	393.750	107,62	42,375
I - II	3.224.800	103,37	333,348
II - III	3.720.800	96,42	358,760
III - IV	1.126.000	93,71	105,577
Total	**8.000.000**	**100,15**	**840,000**

The above estimations have shown two figures for the size of gold alluvial deposits, 2 521 and 840 kg. These ore deposit reserves when compared with similar world gold deposits seems to belong to the small gold alluvial occurrences. The alluvial gold contents are of relatively low grade.

Considering the above given data on the gold contents, the following has to be pointed out:

• The exploration stage is at a very low level. Large distances occur between the sections and between drill holes within the sections.

• Almost all of the drill holes have not reached the depth of alluvial bedrock. It is known that gold is concentrated at these locations.

Anska Reka Alluvials

The Anska Reka drains the waters from the southern slope of Belasica Mountain, crosses the Valandovo valley and also influences the Vardar River. It is approximately 25 km long. According to reports from *B. Milovanovic* this river is gold bearing along its entire length. The Prsten village spring part of the river, appears to be very rich with gold.

The river alluvial investigations were renewed from 1955. During this period, 15 localities were panned and at 6 localities the alluvial sediments were washed by cradle techniques and four boreholes were drilled to a total length of 53,7 m.

Gold presence was proven at only one locality of the 15 localities panned.

In order to gain wider picture about these gold bearing sediments, more important data from cradle washing and drill holes is given Table 2.

Table 2. *Investigation works and obtained results*

Number of sample	**I a, b**	**II a, b**	**III a, b, c**	**IV a, b, c, d**	**V a, b**	**VI a, b**
Sample weigh, kg	750,000	760,00	1.490,000	1.160,000	950,000	1.000,000
Heavy metals weigh, gr.	2.995,000	3.050,000	4.373,000	2.071,000	6.242,000	1.170,000
Gold, g/t	0,038	0,233	0,126	0,870	0,320	0,025

The gold contents in both cases have different meanings. The cradle washing shown worthy results. The drilling works pointed out, the gold is present only.

The data relating to these investigations are debatable. The localities where t panning, washing and drilling activities occurred are not indicated on any maps, t are no more details about gold content estimation (g/m^3), etc.

Based on all the reported data, it appears that some kind of controlling works need to be performed and would be useful.

Strumica Secondary (Alluvial) Gold Occurrences

Alluvial gold explorations relate to the creeks, coming from the Ograzden and Plackovica Mountains, northerly situated of Strumica valley. All creeks are tributaries of Strumica river and

mostly of them have to be auriferous. The Sushevska Reka, Dobroshinska Reka and Strumica River alluvia's were investigated in periods: 1935-36 and 1989-1993, (Fig. 3).

For the first period, Rohatas incomplete report was available (no useful d maps nor original assaying data). For the second period Dikov and Georgievski investigation data for this book have been used.

By shallow sinking shafts the areas of Sushevska Reka, Dobroshinska Reka and of Strumica River were prospected inside first period. Three sediment types were selected and investigated: delluvial, creek and river alluvia's, and the plain flooded sediments.

Prospected deluvials stretches on the hills between the creeks. They are composed of larger quartzite fragments, limonite ore sometimes, all enveloped in a ground materials, On some places deluvial gravel's are present. The prospected creek sites were 300-600 m wide.

River and creek sediments' widths vary of metro part to a few ten of meters. In the upper alluvial parts they consist of fine sand-mud sediments, in lower part, from sand and more coarse gravel's, sometimes mixed with limonite ore. The gold, in common is connected for coarse grained gravel.

Within flooded plains two type of sediments were selected. The first type of sediments relate to the creek (river) courses (recent alluvia's) and the second to the area where creek and river waters outpoured and flooded The recent sediments were 1 to 2 m, the flooded sediments to several meters thick. They were investigated to the underground water level (about 6 m).

The investigation volume data (trenches and shafts) are not accessible.

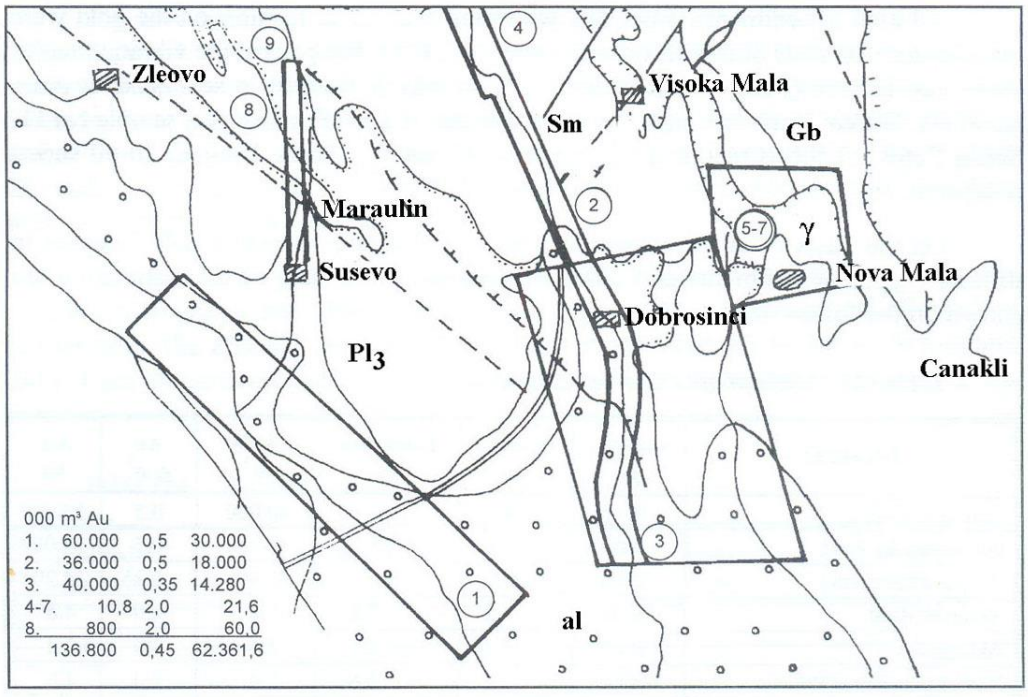

Fig. 4. Aluvial's sediment on Strumica River and Sushevska River.

Note *1 - Strumica River; 2 - Dobroshinska Reka; 3 - All sediments in, by creek waters flooded plains; 4 - Actoprak - East; 5 - Actropak - Southwest; 6 - Nova Mala - Selski Potok; 7 - Nova Mala - Divjak; 8 - Sushevska Reka; 9 - Other creek gorge sediments.*

All kind of sediments, especially with sand and gravel features on the gold were investigated.The pans of 5-6 kg volume were used. On a few places the vibration tables were used as well (Pulec and Divljak) The gold was discovered in sediments at more localities, The contents were stated as sheets per pan or g/m^3. For instance, sample No 11-Selski Potok 20 sheets recorded, samples No 12 and 13 (Potok Divljak) 20-40 sheets numbered, etc.
On the basis of all investigation works Rochata estimated gold reserves in different types of sediments and different area parts, The data of this estimation are shown on the follow Table 3.

Table 3. *Alluvial gold reserves estimation*

Localities	**Lenght, m**	**Width, m**	**Thickness, m**	**Q,000 m^3**	**Au g/m^3**	**Au, kg**
Strumica River	5000	1000	12	60.000	0,5	30.000
Dobroshinska Reka	4000	400	18	36.000	0,5	18.000
All plain sediments	4000	2-2400	16	40.800	0,35	14.200
Aktopark-East	2000	2	0,6	2.4	2,0	4.8
Aktopark SW	2000	3	0,6	3.6	2,0	7.2
Nova Mala-Selski Potok	2000	2	0,6	2.4	2,0	4.8
Nova Mala-Divljak	2000	2	0,6	2.4	2,0	4.8
The other creek valley sections	25.000	2	0,6	30	2,0	60.0
Total				**136.400**		

The ore reserve estimation seems to be very optimistic, of more reasons:As a first, no authentic documents, where the exploration data could be observed. The doubt concerns to the alluvial thickness. In exploration report Rochata sorry, by shafts is not able to go deeper (more than 6 m) of the water table level. On the other side, no data, drilling works have been carried out. At the ore reserve estimation the sediment thickness was used to be 16 m. From the report most part of gold content data are shown as sheet/pan. A few data as g/m^3 were reported only (Potok Divlek and Pulec) The gold content data allay for total sediment thickness, not for real or false bedrock's. This thickness customary are thinner than they were envisaged. At last, the ore reserve although are overestimated, their sizes are too large to be neglected in the future gold evaluation of this area, probably.
A new 42 samples have been taken and panned from Sushevska Reka and Strumica River during the 1989-90 period (Kostov,1990).The gold was confirmed in 76% of the taken samples .The gold contents in samples range from a 1 to more than 15 sheets.
The investigation works were readmitted at Sushevska Reka area during the 1991-93 period. A larger scale of exploration works (Drilling, trenching and digging shallow shafts) were realized. In Sushevska Reka alluvia's, upstream of the village Sushevo, in a 5 km long line, four localities were prospected: Sushevo-800 m long, Poilo-750 m. Govedarnik -300 m and Bair Adri-Papino - 1200 m. In all of these areas 25 shafts, 1-6 m deep with total length 49,9 m and 14 boreholes, 4 to more of 20 m deep with total length 199 m were carried out.

The gold contents represent the average from two or more shaft samples. *Th* highest gold contents allay to alluvial sediments at Bair Adri - Papino locality.
Considering the alluvial gold in this area a few things have to be emphasized :
1. The creeks coming from the Ograzden Mnt .area are goldbearing in any case (Sushevska Reka and Dobroshinska Reka).
2. Due to data from Sushevska Reka (size and gold contents) they could be ranked as small alluvial gold ore deposits.
3. Flooded plain parts from Sushevska Reka, Dobroshinska Reka and Strumica River could (might) have essential importance for gold. But these alluvia's are not yet well investigated as first, and the second, the area is covered by agriculture items.
4. Between Bulgarian border and Radovish area, from the Ograzden Mnt. more smaller or bigger creeks converge to the Strumica valley. Their sediments are worthy to be investigated on the gold.as well.
5. Alluvial gold from Ograzden creek sediments provoke the question where the gold derives from, or are there primary gold deposits in this area and where they are ? Stuka - Ilovica area any how, doesn't coincide with the supposed primary gold occurences.They have to be searched inside Ograzden Mnt. area, probably.

River and Creek alluvial at Radovis Area

Alluvial gold at the Radovis area was initially of interest from the period after the Second World War. Small scale panning activities were carried out from 1954 to 1955. The upper parts of the Plavija River (the beginning of the Strumica River), Madenska Reka and their tributaries were unsystematically panned. At the time heavy fraction investigation was carried out *(* Babic, 1960*)* over the Macedonian area, including the area of Radovis.
As can be seen, almost all of the creeks at the Radovis area appear to be gold bearing.
Heavy fraction investigations (panning) have been done at 6 localities. Cradle washing was performed at 4 localities and drilling works at 3 localities (Ivanov, 1955*).* Gold content data are only available for the cradle washing activities.
Most gold content data highlighted the low grade gold alluvial occurrences. The positive side of these occurrences is that they are numerous and have not been explored to bedrock.
Alluvial gold in these creeks and rivers appears derived mostly from primary Bucim - Borov Dol copper-gold occurrences (Tertiary metalogeny). The other sources are situated at the Plackovica Mountain area. Their primary genesis has not been discovered to date. They likely belong to an older metalogenic epoch.

Lakavica Gold Alluvial Sediments

Lakavica River is one of the left tributaries of the Bregalnica River. It drains the waters of the areas north to west of the Konecki Planini and southwest of the Smrdes Planini. It is approximately 30 km long.

The downstream part of the Lakavica River, approximately 10 km southeast of Stip city has historically been investigated for gold on many occasions. Gold investigation data are not currently available.

Bregalnica River Alluvials

Bregalnica River is the largest left tributary of the Vardar River. It is more than 100 km long. Parts of the Breagalnica River alluvials (Istibanja, Delcevo and Mitrosinci) were prospected for gold prior to the Second World War (Milovanovic*).* Based on this data, alluvials at Delcevo were 10 km long, 200 m wide and around 5 m thick. The investigation works have incorporated panning. Course gold grains have been recorded at the Mitrasinci area. More detailed data is not available.

Data derived from that period (prior to the Second World War) is of low credibillity. From this point of view the data is worthy to be checked (alluvial size and gold bearing potential).

Peklanska Reka Alluvials

Peklanska Reka is the left tributary to Bregalnica River. It traverses the area between the villages of Peklani and Vinica washing the Pliocene sand-gravel sediments. A number of gold investigation works has been carried out *(Dzalev, 1980).* Two drill holes and 6 shallow shafts were installed, located within the Peklanska Reka alluvial sediments and Pliocene sediments. Each shaft and drill hole meter was sampled and the material treated on Gold Sever (shafts) or panned (drill holes).

As can be seen, the above alluvials are all gold bearing. The contents are very low in sediments, higher grade contents were obtained underlying these sediments (150 - 200 mg/m^3).

One sample, around 200 kg weight was extracted from the Pliocene sediments (gravel facies), from the place where the new route traversed the sediments. The location was situated around 0,5 km east from the village of Vinica. The sample was treated on a vibrating table and several gold grains were obtained. It points out that Pliocene sediments were also gold bearing.

During the 1978 period Aleksandrov had taken 5 samples from the old mining works within the old alluvial terraces. They were situated at 1,2 km under the Peklani village. Samples were assayed by Todorova, Lead and Zinc Smelting Plant, Veles. The following gold contents were reported as presented in *Table 4.*

Table 4. *Gold chemical analyses*

No of samples	**Au g/t**
1	4,4
2	1,4
3	2,0
4	1,4
5	2,0
Average g/t Au	**2,2**

The gold contents are of a very high grade at the bottom of the old alluvial terraces. It is worthy that the gold contents be checked and subsequently investigated.

Lakavica Gold Alluvial Sediments

Lakavica River is one of the left tributaries of the Bregalnica River. It drains the waters of the areas north to west of the Konecki Planini and southwest of the Smrdes Planini. It is approximately 30 km long.
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Data about investigation works and obtained gold content data is shown in *Table 5.*
As can be seen, the above alluvials are all gold bearing. The contents are very low in sediments, higher grade contents were obtained underlying these sediments (150 - 200 mg/m^3).
One sample, around 200 kg weight was extracted from the Pliocene sediments (gravel facies), from the place where the new route traversed the sediments. The location was situated around 0,5 km east from the village of Vinica. The sample was treated on a vibrating table and several gold grains were obtained. It points out that Pliocene sediments were also gold bearing.

Table 5. *Investigation works and gained results*

Exploration works	Depths	Bedrock, m	Grain quantities in B-D	Gold in mgr.	Materials, m^3/m'	Total, m^3	Gold in $mgr./m^3$
D-I	8,0	6,5	64	4,0	0,0314	0,2041	19,59
D-II	14,6	6,0	52	11,9	0.0314	0,1884	63,10
B - 1	6,0	7	520	6,0	0,634	3,8140	1,57
B-2	6,0	9	324	14,6	0,634	3,8140	3.83
B-3	1,5	Watertable	132	2,0	0,634	0,9510	2,10
B-4	8,3	7,8	452	90,6	0,634	4,9530	18,29
B - 5	8,5	?	404	1 1,0	0,634	5,3976	2.03
B-6	10,0	?	142	5,0	0,634	6,3500	0,79
Total	62,9			134,1		22,2365	6,03

During the 1978 period Aleksandrov had taken 5 samples from the old mining works within the old alluvial terraces. They were situated at 1,2 km under the Peklani village. Samples were assayed by Todorova, Lead and Zinc Smelting Plant, Veles. The following gold contents were reported as presented in *Table 6.*

Table 6*. Gold chemical analyses*

No of samples	Au g/t
1	4,4
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3	2,0
4	1,4
5	2,0
Average g/t Au	2,2

The gold contents are of a very high grade at the bottom of the old alluvial terraces. It is worthy that the gold contents be checked and subsequently investigated.

Pcinja Alluvial Sediments

Prinja River is the left tributary of the Vardar River. It is more than tens of kilometers long. Pcinja alluvials upstream of the Katlanovo appear to be gold bearing. The alluvials were prospected between the two World Wars and during 1987. Investigation works were concentrated on recent alluvials of more creeks, influenced in Pcinja River (Zabarski Potok, Dlabok Dol, Kamilarski Potok, Draganov Dol) Panning of the alluvials was only carried out. Gold content was reported as: number of grains/pan, or if present "a few" The gold was seldomly quantified, as presented in *Table 7.*

Table 7. *Gold alluvials at Pcinja River*

Localities	Sample No	Gold contents g/m^3
Old terraces	1	"Only few gold"
	2	0,0340
	3	0,0256
	4	0,0035
	7	0,0242
Zabrdski Dol at Selo		0,8050
	13	"Larger gold quantities"
	14	"Larger gold quantities"

The gold was panned from the upper (shallower) alluvial parts. Gold was not searched at the alluvial bottoms, Investigations were prevented by the high level of underground waters.

The quartz row materials have been investigated from the Kriva Reka sediments (Zlatkovic, 1987). The finest fraction of these sediments has been investigated for gold. The sample consisted of 62 separate smaller samples from 19 drill holes. The highest gold content reached was 9,2 mg/m^3 gold.

Owing to the Kriva Reka influence on the Pcinja Reka, the gold in Pcinja Reka likely derives from Kriva Reka sediments.

The conclusion, based on all this data appears to be that the gold is present in the sediments of these rivers, but the investigation level is of a low scale and probably unsystematic.

Skopje - Veles Area Creek Alluvial

Several creek sediment locations at this area have been prospected for gold. Within the Skopje area, Markova Reka and Kadina Reka were investigated by small scale washing activities. Within the Veles area Topolka River sediments were washed in a few places. These activities were carried out between the period of the two World Wars and one part after the Second World War. The data from these activities were provided by various prospectors: Shot (1936), Draskocy (1934) and Ivanov (1955).

Markova Reka sediments were investigated between the village of Varvara and the bridge situated near the village of Dracevo, over a line approximately 10 km long. Panning of the alluvials was performed in many places and material washing from one shaft, 5 m deep was carried out. Shot, suggested that these sediments are worthy of more detailed exploration.

Ivanov (1955) has also realised an investigation program on the Markova Reka alluvials. Eight localities were prospected by cradle washing. In addition, 13 drill holes with a total depth of 53,6 m have been drilled. Only some of the obtained data is currently available. A small proportion of this data is shown in *Table 8.*

***Table 8**. Investigation works and gained results at Markova Reka*

Localities	**I a, b, c**	**II a, b, c**	**IV a**
Samples weight, kg.	610,0000	900,0000	850,0000
Concentrate weight, g	5.180,0000	8889,0000	4.160,0000
Gold content, gr./t	0,0205	0,0108	0,0325

Ivanov's report is not completed. Maps with working localities and all obtained data are not available. It appears a great proportion of the report is lost. Nevertheless, this sediment seems to be gold bearing and a future more detailed investigation is recommended.

Kadina Reka alluvials were panned in several places. Gold presence data highlighted its upgraded concentration. There is not more detailed information about the gold contents. The size of these alluvials appears to be of small scale.

Information about gold presence at the Topolka River sediments relates to two periods. The first is associated with the time between the two World Wars (Shot, et. al. 1934) and the second relates to after the second World War (Ivanov, 1956). Gold washing activities have been carried out at many places (G. Jabolciste, Melnice, G. Vranovci, Caska. The gold presence data from the first period activities appear to be unpleasant. Sho*t* after the second world war revived washing alluvials by cradle at five localities. The obtained data is shown in Table 9.

***Table 9.** Obtained results at panning of the Topolka River alluvials*

Localities	**II a, b**	**III a, b**	**V a, b**
Sample weight, kg	800,000	800	800
Gold content, gr/t	0,023	0	0

The gold presence is proved, even though it is of low grade. Unless the bedrock of the alluvials is reached, the evaluation of these sediments will be without any certainty.

CONCLUSIONS

From the work done, the above gold alluvial data and available data associated with this type of ore deposit, some of the alluvials have eventually been evaluated.Considering the above data, several dilemmas have risen:

• Were the gold alluvials previously well exploited.

• Are there gold alluvials that represent some kind of potential with suitable levels and techniques for development?

• Has the gold derived from where the primary gold ore deposits were situated ? To which geological formation is the gold associated with (Metalogenic epoch, magnetism, structure controlling factors, etc.) ?

• The answer can be given in brief as far as responsible data allows.
• From the given data it can be seen that the levels of investigation of the treated alluvials was just to see if the alluvials are gold bearing The known alluvials were investigated by panning or by drilling at different diameters. The most investigated alluvials were those at Konska Reka (Gevgelia). Large diameter drilling works indicated that the river is gold bearing, the appraised reserves are estimated at more than one hundred thousand cubic meters, but at low grade gold contents. Bedrock was not reached, except at one borehole. This is the only reason the alluvials should be explored in the future.
• Gold contents at the Pliocene base conglomerate at Peklani village are of a very high grade. Their validation is highly recommended.
• Other gold alluvial areas were investigated on a low level basis, or they are of a small size (Sysevska Reka at Strumica Valley).
• Almost all the investigated alluvials are gold bearing, but their levels of investigation are very low. Eventually future investigations could more precisely answer their true potentials.
• The source for the alluvial gold is one dilemma that has to be resolved. This problem has not been investigated in detail at any of the listed ore occurrences. It seems many gold alluvials relate to the ore occurrences associated to Tertiary metalogeny as for instance at the Radovis area, or at Kozuf area, etc. The roots of these occurrences have not yet been found, nor were looked for.
• It is not clear where the gold has derived from at Anska Reka (Valandovo), Strumica River alluvials, Bregalnica River, Peklani Pliocene conglomerates, Markova Reka and Topolka at Skopje or Veles. It is recommended more attention to this problem is paid in future investigation works.

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